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Annual Meeting of the Association for Tropical Biology and Conservation

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Tropical Ecology and Society
Reconciliating Conservation and Sustainable Use of Biodiversity

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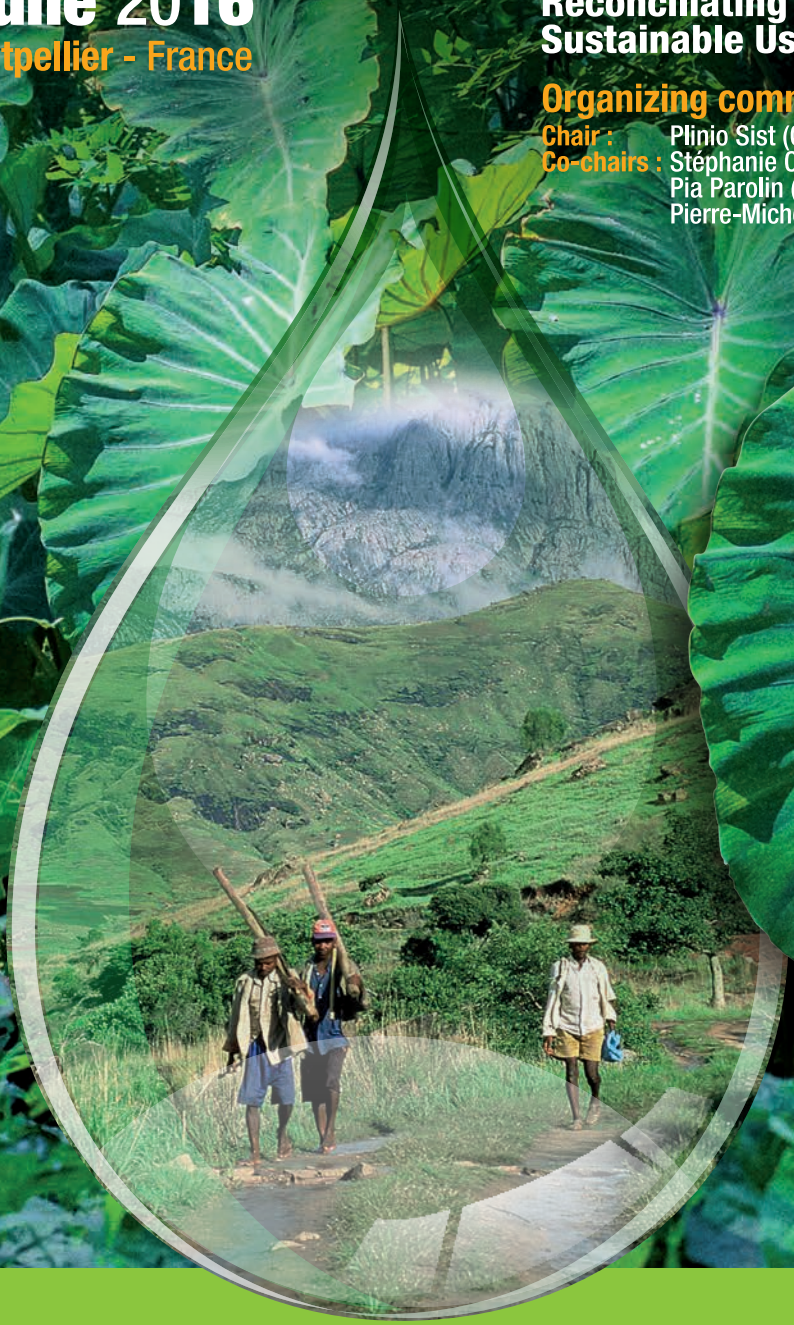

PROGRAM & ABSTRACTS

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O52-10 – S52 *Free Session: Tropical ecology*
Wednesday 22 June / 14:30-17:30 – Barthez

What is the relative importance of physical, biological environment and geographic distance in shaping medium and large fauna assemblages in lowland Amazonia?

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Understanding the response of communities to spatially heterogeneous environmental conditions is an important challenge for ecologists. Whereas broad-scale Amazonian forest types have been shown to influence the structure of the communities of medium- to large-sized vertebrates, their natural heterogeneity within the terra firme rainforests remains poorly investigated. Here we question the drivers of the diversity and composition of medium and large fauna assemblages from a species-neutral, functional and phylogenetic perspective.
In this study, we disentangled the effects of various physical, biological and spatial covariates on the composition and diversity of 21 communities of 19 medium- and large-sized vertebrates in neotropical terra firme rainforests, French Guiana (~84,000 km²). We sampled each local vertebrates community using standardized line transects (sampling effort of ~5,000 km). We estimated species densities using distance sampling method taking into account temporary emigration and imperfect detection. Raw population density data were used to analyse species-neutral assemblages. Functional compositions and diversities were estimated from 9 morphological and behavioral traits while phylogenetic ones were measured from discrepancies between taxonomic levels (from species to classes). Physical environmental conditions were extracted from remote sensing data (e.g. mean landforms slope, mean elevation). Biological environmental conditions were estimated in the field (e.g. biomass, dominant tree families). Finally, geographic distances between sites were calculated to assess spatial effects on the structure of communities. We implemented variation partitioning to determine the relative importance of each covariate in shaping fauna assemblages.
At this spatial extent, we can hypothesize that biological conditions explain better composition and diversities than physical conditions because of their potentially direct influences on fauna. In addition, these results should allow us to better understand how much environmental filtering and geographical processes shape patterns of medium- and large-sized vertebrates distribution.

O52-11 – S52 *Free Session: Tropical ecology*
Thursday 23 June / 14:30-17:30 – Sully3

Large-scale Neotropical genera distributions predict drought-induced mortality of trees

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Background: Droughts are an increasing threat for tropical rain forests, with impacts to forest biodiversity and ecosystem services, including carbon storage. Within the tropics tree species richness is positively associated with precipitation, which is likely to be a consequence of water-stress constraining important physiological processes of most taxa. If so, macroecological distributions of tropical taxa would provide valuable insights about the potential impacts of droughts on Neotropical diversity.
Methods: We combine data from 531 inventory plots of closed canopy forest across the Western Neotropics to investigate how water-deficit influences the distribution of tropical tree genera. For that, we firstly calculated genera 'water deficit affiliation' (WDA), which represents the mean of taxa distributions along the water-deficit gradient weighted by their abundance. Secondly, we tested the ability of WDA to predict drought-induced mortality at one natural and four experimental droughts across the Neotropics.
Results: Drought tolerant genera tend to be disproportionally widespread across the precipitation gradient, reaching even the wettest climates sampled. However, most genera are restricted to wet areas. Macroecological distributions did predict drought resistance, with wet-affiliated genera tending to show higher drought-induced mortality regardless of their life history stage and after accounting for the influence of phylogeny.
Discussion: The large-scale distributional patterns of genera with respect to climate have predictive value for their vulnerability to water-stress. It is the first time this question has been assessed at a macroecological scale for the tropics. Our results suggests that the anticipated increase in extreme dry events for this region may threaten biodiversity, given that the majority of Neotropical taxa are wet-affiliated and that most of these have relatively small ranges. Overall, this study establishes a baseline for exploring how floristic composition of tropical forests may shift in response to current and future environmental changes in this region.